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Revere

**COPPER
& BRASS**

**Pipe
& Tubing**

REVERE

PROVIDES

dependable copper and copper alloy products for building construction and maintenance, and . . .

OFFERS

competent technical assistance in the selection and application of these materials to all building requirements.

FOUNDED BY
PAUL REVERE



REVERE BUILDING PRODUCTS

Sheet Copper and Leadtex (lead-coated copper) . . .

for roofing, gutters, conductor pipes, flashings, skylights, spandrels, decorative applications and termite proofing, also for range boilers.

Cheney and Revere Thru-Wall Flashing . . .

for protecting buildings against seepage, leaks and efflorescence.

Copper Water Tube, Brass Pipe, Red-Brass Pipe and Copper Pipe (S.P.S.) . . .

for water supply, hot and cold water lines, heating lines, drainage lines, oil burner, air conditioning and refrigerant lines, lawn irrigation and industrial piping.

Herculoy

for range boilers and hot water storage tanks, chemical containers and unfired pressure vessels.

Extruded Shapes of Architectural Bronze, Aluminum and Nickel-Silver, also Panel Sheets . . .

for the construction of doors, windows, grilles, store fronts, screens, pilasters and the like; Panel sheets of architectural bronze and other alloys for use with extruded shapes in the construction of the above.

Round, Square and Special Shaped Tubes in various alloys . . .

for door stiles and grilles in color match with Architectural Bronze Extruded Shapes and Panel Sheets.

Revere products can be safely written into any specification with assurance of quality and prompt delivery from Revere's Mills or through Revere's Distributors. Further information on any Revere Products supplied on request to any of the offices listed on rear cover.

IMPORTANCE OF LONG-LIVED PIPING

It has been estimated that residence and building owners in the United States could save \$86,000,000 a year by using copper tube and brass pipe, in place of rustable materials, to prevent piping deterioration and consequent impairment and interruption of service, and ultimate costly replacements. In 1937 the value of residential construction in the United States was \$1,222,007,000. \$87,000,000 is more than 7% of this sum. These figures briefly and forcefully indicate the importance of using long-lived piping wherever practicable in every type of building construction.

Piping of this type is of special importance in water service lines from main to meter; lines for hot and cold water supply throughout the building; water and steam lines for heating systems; waste and vent pipe systems; water lines and refrigerant lines for air conditioning and refrigerating installations; oil lines for oil heater and tank installations; water lines for fire protection systems; and all general piping applications where rust and corrosion are factors.

In general, this means using copper water tube, brass pipe or copper pipe because they are resistant to most corroding factors common in water supplies.

However, the piping material for water lines should never be determined without knowledge of the local water characteristics, which may have unusual corroding properties. Revere Copper and Brass Incorporated offers the aid of its engineers and laboratories for water analysis and recommendations leading to specification of piping material of proper composition for best service and lowest ultimate cost in any given application and locality.

THE TREND IS TOWARD COPPER AND BRASS

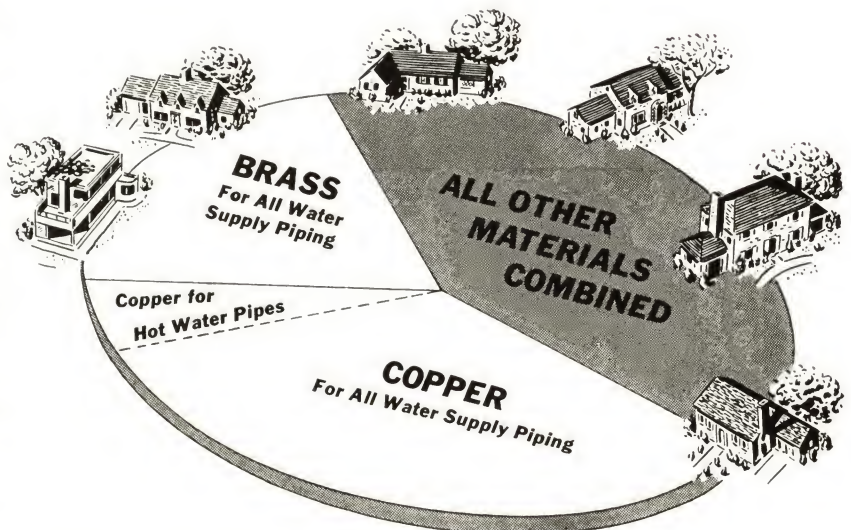
Pipe may be made from nearly all metals in common use. In recent years, however, there has been an increasing public recognition of the value of construction materials which are long lived and which, as nearly as possible, eliminate need of replacement.

This trend has been reflected in the increased sales of brass and copper pipe and copper water tube in relation to sales of all types of pipe. Compared to rustable pipe, even during the recent years when price has been a major consideration in practically all purchases, brass and copper tube and pipe have made extensive gains.

This was due in part to replacement of rusted-out pipe with copper and brass, because people realized the improvidence of repiping with material that would last only a few years; in part to the recognition by the public, as well as architects, engineers and contractors, of the fallacy of installing cheap materials that had a relatively short life; and in part to the fact that modern processes for treating and purifying water introduce factors that tend to increase the corrosive action of such water.

EVIDENCE of the trend toward the use of copper and brass for piping is found in an analysis of the specifications for 131 residences described in the "1938 Book of Small Houses". The material used for water supply piping is named in the specifications given for 107 of these houses. In 31 houses copper tube was used for all water supply lines. In 3 others copper tube was used for hot water lines. In 24 houses brass was used. Total mentions of copper alloy were 54% compared with 46% for other materials.

A similar analysis of 11 Resettlement Administration projects, also contained in the "1938 Book of Small Houses" discloses that copper or copper alloy for piping was mentioned in 63% of the specifications.



REVERE PRODUCTS FOR LONG-LIVED PIPING

To provide permanently rust-free service Revere manufactures the following pipes and tubes to meet various water conditions and installation requirements:



All Revere Pipe and Tube is Stamped as a Guarantee of Quality

REVERE COPPER WATER TUBE A pure copper pipe for plumbing and many other piping installations. Joints and connections are made by using soldered or compression fittings, thereby eliminating all threading.

REVERE BRASS PIPE (Yellow Brass) is designed for ordinarily corrosive water. It has a long record of satisfactory service and is favored by plumbers because of its easy working and threading qualities.

REVERE RED-BRASS PIPE (85% Copper) is designed for extremely corrosive waters. Where the utmost is demanded of a pipe, commercially available at reasonable price, this pipe is recommended.

REVERE COPPER PIPE (99.9% pure copper) in standard pipe sizes for use with threaded fittings. In certain localities, where water conditions are unusual, this pipe is preferred. It also has many uses in industry.

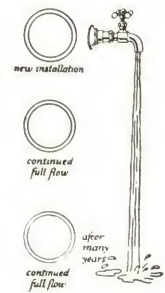
PIPE THAT RUSTS



EXPERIENCE shows that iron and steel pipes rust out sooner or later, their life depending on the condition of the water supply and kind of pipe used. Even before they clog with rust you are bothered with rust-colored water, then with reduction in flow. Finally, the pipes become so clogged that, when you turn on the water full, you get only a trickle. When pipes become rusted, they also weaken and water pressure is likely to cause them to burst or leak at the joints, causing all sorts of trouble and expense.

Play safe, select piping with the same care you do plumbing fixtures: specify Rustproof Revere Copper Water Tube or Brass Pipe.

COPPER WATER TUBE OR BRASS PIPE



REVERE PRODUCTION FACILITIES AND EXPERIENCE

The ability of Revere Copper and Brass Incorporated to cooperate effectively with architects and builders in recommending and supplying piping of permanently economical and efficient character is derived from its large and extremely modern facilities for manufacturing copper tubing, and brass and copper pipe, of the highest grade; and from its 38 years of experience in furnishing these materials through its distributors to the building trades, for a great variety of residential, commercial and industrial structures and special applications.

Every precaution in the way of laboratory control and close inspection and tests during manufacture is taken to safeguard the quality of these products; and every possible aid to their proper application is offered to architects and contractors.

As a result, the average installation of these Revere products has shown a very low cost of maintenance and repairs. In fact, many of the installations of 20 to 30 years ago have required no attention whatever in the way of service or repairs.

COPPER WATER TUBE

WHAT IT IS

REVERE COPPER WATER TUBE (99.9% pure) is a cold drawn, seamless copper tube for water supply and many other applications. It is completely deoxidized and possesses a gun-barrel finish inside, free from flaws and blemishes. Each length is stamped "Revere Type K", "L" or "M", as a means of identification and a guarantee of quality. Used with Streamline Solder Fittings or any standard make of solder or compression fittings, it furnishes a complete piping system which is economical to install and, above all, permanently non-rusting, resistant to corrosion and long-lived.

WHERE TO USE IT

A REVERE COPPER WATER TUBE installation is especially recommended for economical service in the following:

1. General plumbing, piping and drainage systems.
2. Water services—from main to building.
3. Fuel oil lines—from tank to oil burner and for range burner lines.
4. Hot water, vapor and steam heating systems.
5. Heat control piping systems.
6. Lawn irrigation—underground lines and sprays.
7. Automatic sprinkler systems.

8. General factory piping.
9. Expansion joints and coils.
10. Anaesthetic lines.
11. Compressed air, gas and chemical conduits, refrigeration lines, etc.
12. Industrial piping.

Various public works projects in the last few years have specified Revere Water Tube for:

1. Underground water services.
2. Water filtration for resistance and non-rusting lines to control table and under drain piping.
3. Gas distribution for service lines.
4. Heating lines in sewerage disposal tanks.

ADVANTAGES OF REVERE COPPER TUBE

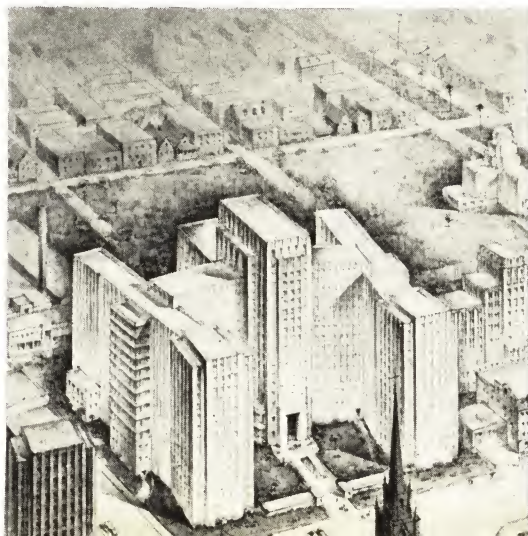
A Revere Copper Water tube installation possesses many advantages due both to the metal itself and to the improved and modern methods of installation.

WILL NOT RUST Being made of pure copper, Revere Copper Water Tube is non-rusting and, under all ordinary conditions, provides long service with an absolute minimum of trouble.

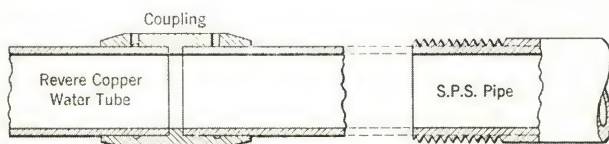
REASONABLE COST The use of this tube with soldered or compression fittings now makes possible a superior installation at a reasonable price so that a long-life piping system of this material can be considered for practically any job.

ECONOMY IN SIZES There is no rust accumulation with Revere Copper Water Tube. Therefore, it is not necessary to install over-size pipe.

REVERE COPPER WATER TUBE IS RECOMMENDED FOR ALL TYPES OF BUILDINGS — LARGE AND SMALL



NO THREADED CONNECTIONS An important advantage of a Revere Copper Water Tube installation is that it is made without the use of threaded connections.

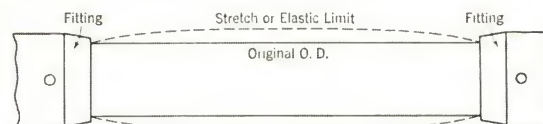


Illustrating the saving of metal with Revere Copper Water Tube.

Revere Copper Water Tube is joined with solder or compression fittings, which means a considerable economy in metal cost without loss of strength. The wall thickness of Revere Copper Water Tube is uniform throughout.

FREE WATER FLOW The gun-barrel finish on the Revere Copper Water Tube insures the rapid passage of water with a minimum of friction. Size for size, copper water tube delivers, and continues to deliver, a maximum amount of water.

RESISTS FREEZING The ductility of Revere Copper Water Tube, soft temper, is of particular importance in case of accidental freezing. When water freezes in this tube, the tube yields slightly to accommodate the expansion. An increase of as much as 25 per cent in diameter will not harm an annealed copper tube; water, when it freezes, expands about 9 per cent.



Revere Copper Water Tube, being 99.9% pure copper, expands with each freezing, up to its elastic limit. This limit is so great that sections of Soft Temper Revere Copper Water Tube have been repeatedly filled and frozen before bursting. On the sizes most generally used in water supply piping, five freezings, on the average, were necessary to cause bursting.

TYPES OF REVERE COPPER WATER TUBE

Revere Copper Water Tube is furnished in three types, known as K, L and M, which meet Government specifications WW-T-799 and A.S.T.M. specifications B88-33 for this product. These three types meet most corrosive conditions and price considerations.

Type K has the heaviest wall thickness of the three and is recommended for general plumbing purposes, particularly where water conditions are severe; (see page 8 regarding special conditions) also for underground services, gas, steam and oil lines and industrial uses. It is joined with either Streamline Solder Fittings or compression fittings. Furnished in both hard and soft tempers.

Type L has a medium wall thickness. Suitable for normal water conditions, it is recommended for general plumbing, also gas, steam and oil lines and industrial uses. It is joined with either Streamline Solder or compression fittings. Furnished in both hard and soft tempers.

Type M furnished in hard temper only; has a lighter wall than K or L. It is intended for general plumbing purposes where water conditions are normal and where low cost is a primary factor; also for gas, steam and oil lines and industrial uses. It is joined only with Streamline Solder Fittings or other standard soldered fittings.

Revere also manufactures Types O and U for special uses. Standard dimensions, weights and properties for all five types of Copper Tube are shown in table on page 13.

TEMPER OF REVERE COPPER WATER TUBE

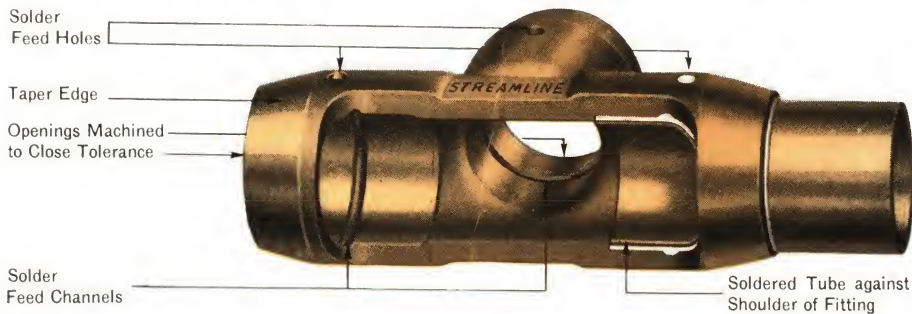
HARD TEMPER Revere Copper Water Tube — Hard Temper—is recommended for new work and should always be used for exposed piping. In sizes up to 1 inch, Type K (Hard Temper) can be bent cold with an inexpensive hand-operated bending tool, thus eliminating many fittings and producing a smooth flowing water system. There has been a definite trend from the use of soft temper to the hard temper in recent years. Hard temper is also preferable for use with Streamline and other solder fittings.

SOFT TEMPER Soft temper tube is for use wherever flexible piping is desired. It has particular advantages for replacements, where it can be worked between the walls and long runs made without couplings. This eliminates much of the tearing up ordinarily necessary in replacement work with its attendant carpentry, replastering, repainting, etc.

For services from main to building, soft temper always should be used. The long lengths eliminate fittings along the line. The flexibility makes it easy to make bends in cramped quarters around obstructions, etc., and compensates for any travel of the main or settling of the fill.

FITTINGS FOR REVERE COPPER WATER TUBE

STREAMLINE SOLDER FITTINGS



The Streamline Solder Fitting is especially recommended for use with Revere Copper Water Tube. However, this tube is manufactured to fit any standard make of compression or soldered fitting. Both compression and soldered fittings are thoroughly satisfactory when properly installed and are made in all types, including tees, elbows, couplings, adapters, etc.

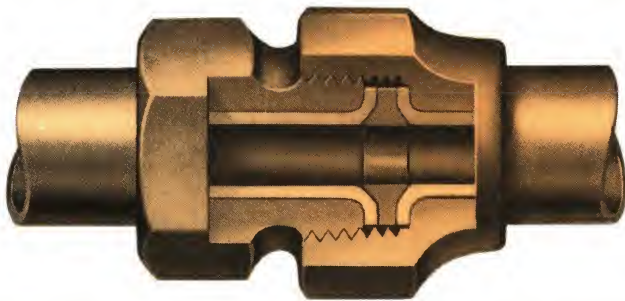
The Streamline Solder Fitting, which connects the piping by soldering rather than by threading or flaring, forms a patented soldered joint that is an outstanding piping development, offering important new advantages and economies in all phases of plumbing lines, service lines, heating systems, and in numerous phases of industrial piping. The fitting is only slightly larger than the tube itself, and use of a wrench is not required; therefore piping is easily installed with this soldered fitting in cramped quarters where it would be difficult or impossible to make a good joint with threaded couplings or compression fittings. Furthermore, joints properly made with Streamline Soldered Fittings are stronger than the pipe itself.

It should be noted in the illustration above that the Streamline Solder Fitting provides a smooth, uninterrupted surface, insuring minimum resistance to flow. Installation is quickly made by heating the fitting after it has been placed over the tubing, and running in solder through the holes provided. Capillary attraction causes the molten solder to completely fill the space between tube and fitting, producing a perfect joint.

This is a fitting made for the mechanic, and requiring a mechanic's skill to install. Properly installed it is ideal for both concealed and exposed installations, because it not only promotes dependable, trouble-free service, but presents a far more attractive appearance than the ordinary run of S. P. S. (standard pipe size) piping installations.

COMPRESSION FITTINGS

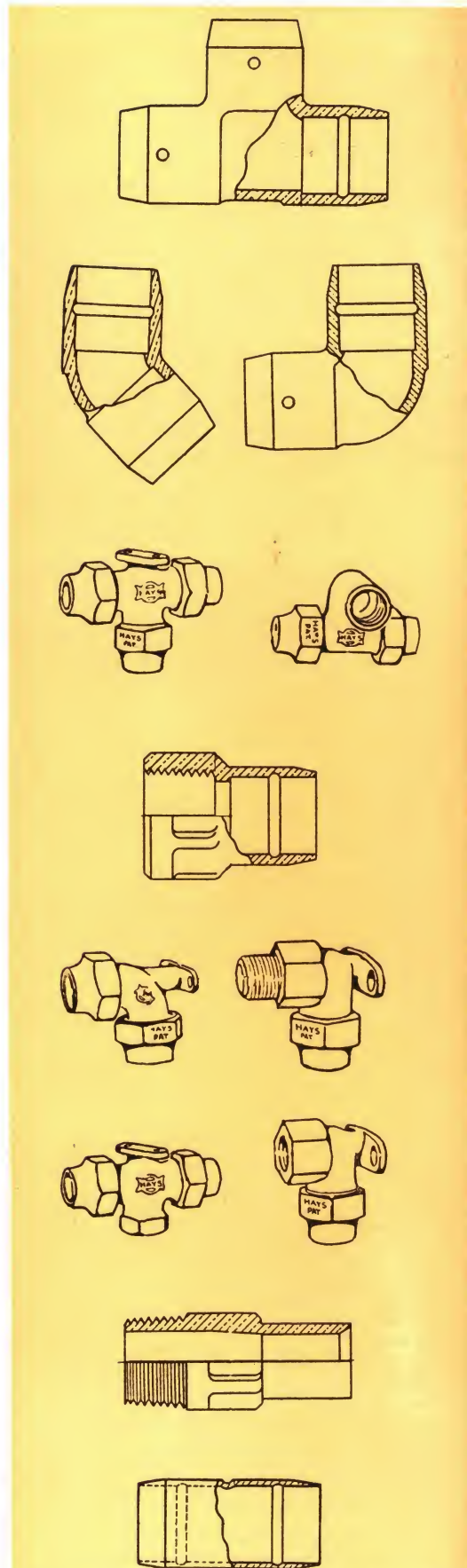
Compression fittings have been used for many years with copper tube. The tightness and strength of joints made with this type of fitting have been thoroughly proved by long service in locomotives, steamships, steam lines, refrigerating systems, automobile and airplane fuel lines and many other exacting applications. The



Hays Double-Seal Fitting is particularly efficient because of its double-seat feature, composed of a 45 seat holding the tube in a wedge and a 90 seat locking it and absorbing all strain and vibration. Revere Type K (heaviest weight) Copper Tube is recommended for use with compression fittings. Either soft temper or hard temper Type K Tube may be used without danger of cracking or splitting. As a rule compression fittings are not used with pipe sizes exceeding two inches.

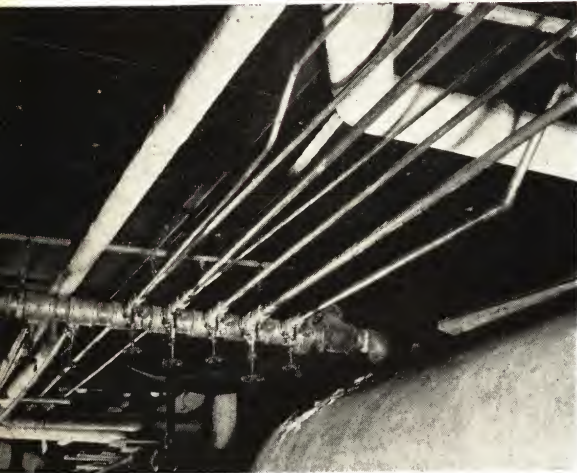


REVERE COPPER AND BRASS INCORPORATED 7

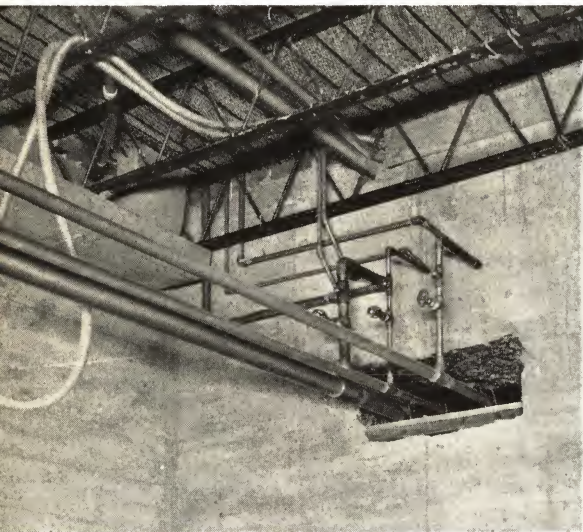


A FEW OF THE MANY TYPES OF
STREAMLINE SOLDER AND DOUBLE-
SEAL COMPRESSION FITTINGS

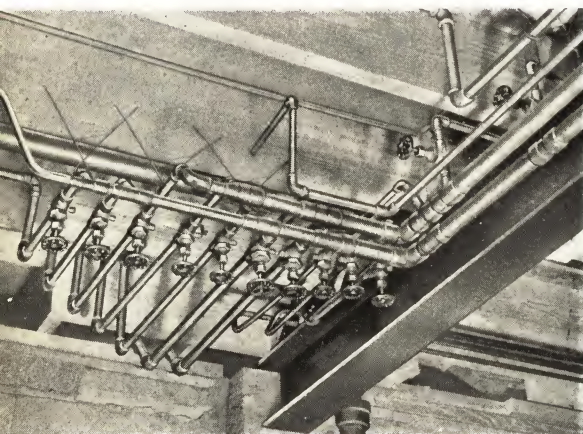
REVERE COPPER WATER TUBE FOR WATER SUPPLY



Approximately 2000 feet of Hard Temper Type L Tube was used in this Kresge Company Store in Cleveland. Replacement was made without interruption to business.



Neat, compact, long-lived, Revere Copper Water Tube with Streamline Fittings in a new Long Island residence.



Main manifold installation in a Cleveland residence. Revere Copper Water Tube (Type L, Hard Temper) and Streamline Solder Fittings were used. Plumbing Contractor: Reed & Campbell.

Revere Copper Water Tube will provide long-lived piping service for nearly all kinds of water. Generally speaking, pure copper or copper alloys are superior to other commercial metals for practically all water conditions.*

Revere Copper Water Tube meets modern requirements for long-lived building materials that can be installed at no penalty in cost. The building owner gets the benefit of permanently rust-free piping at low cost.

It is difficult to give accurate data on relative costs of copper water tube installations compared with other types, because special circumstances, such as the nature of the piping, lay-out, local labor rates, experience of the contractor with copper water tube installations, etc., influence the cost of each job. An installation of Revere Copper Water Tube, however, does provide rust-free piping at less cost than other types of rust-free materials. First costs for installations of Revere Copper Water Tube, Type M, are competitive with those of rustable pipe. In many instances Type L can be installed on a competitive cost basis. The ultimate cost of any type is less than that of rustable pipe.

NEW WORK For new work, straight lengths of Revere Copper Water Tube, Hard Temper, are recommended and favored by journeymen plumbers accustomed to working with rigid pipe. The finished job presents a neat and workmanlike appearance that will stand comparison with any type of piping installation. When the hard temper tube is used, fewer straps and hangers are needed to prevent sags.

In sizes up to and including 1", Revere Copper Water Tube (Type K, Hard Temper) in addition to possessing the advantage of coming in straight lengths can be perfectly bent with a hand-operated bending tool. This feature saves fittings, enhances appearance and reduces friction losses to an absolute minimum.

REPLACEMENT WORK In replacement work when the work is exposed or readily accessible, the recommendations under "New Work" should be followed. However for concealed work in walls, etc. Types K or L, Soft Temper Tube should be used. A great part of the cutting of walls, masonry, painting, etc., can be eliminated by taking advantage of the flexibility of Revere Copper Water Tube. Only small openings are necessary near fixtures.

***NOTE:** For salt water lines Admiralty Tubing is recommended rather than copper.

Also where high free carbon dioxide is present in combination with low permanent hardness, all pipes made of commercial metals will tend to corrode. In most installations rapid failure develops. When plain copper tubing is used, such a condition is likely to cause a green staining of enamel plumbing fixtures which, while unsightly, does not constitute a health hazard. Under these conditions, we recommend the use of tinned copper tube. Revere tube of this type is coated with pure tin on both the outside and inside of the tube. This coating is of uniform thickness and has a smooth surface. The use of Revere Tinned Copper Tube has solved the so-called "green water" problem in a large number of installations. Further information on request.

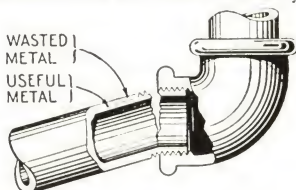
ADVANTAGES OF COPPER WATER TUBE

SMALLER SIZES From many years' experience on a variety of work, it would appear that smaller sizes of copper tube may be used than is common practice in iron-pipe installations. This is true because no allowance need be made for loss of head due to accumulation of rust.

The following table from the Copper Tube Handbook, published by Copper and Brass Research Association gives some interesting comparisons.

Iron Pipe, Nominal Diameter	Corresponding Suitable Sizes for Copper Tube	
	Hot Water	Cold Water
1/2 inch	3/8 inch	3/8 inch
3/4 inch	1/2 inch	1/2 inch
1 inch	3/4 inch	3/4 inch
1 1/4 inch	1 inch	1 inch
1 1/2 inch	1 inch	1 1/4 inch
2 inch	1 1/4 inch	1 1/2 inch
2 1/2 inch	1 1/2 inch	2 inch
3 inch	2 inch	2 1/2 inch

SAVES METAL Since threaded connections are not necessary Revere Copper Water Tube has a much thinner wall thickness than S.P.S. pipe without any loss of strength. This saving in metal means a consequent saving in cost.



SAVES FITTINGS Revere Copper Water Tube (excepting Type L, Hard Temper and Type M) can be bent to meet installation needs. This cuts down the number of fittings, particularly elbows.

SAVES SPACE A plumbing installation with Revere Copper Water Tube and Streamline Solder Fittings can be assembled in a minimum of space. Where there is room for the tube, a joint can be made up.

NON-RUSTING Revere Copper Water Tube is non-rusting and under all ordinary conditions provides long service with a minimum of trouble and cost.

LOW PRESSURE LOSS The gun-barrel finish on the inside of Revere Copper Water Tube insures the rapid passage of water with a minimum of friction. Friction losses are also reduced because the use of Streamline Fittings permits free flow; and easy bending of Revere Water Tube reduces the number of fittings used.

PROTECTION AGAINST FREEZING The ductility of Revere Copper Water Tube (soft temper) is important when water freezes in the tube. The tube yields slightly to accommodate the expansion but does not burst.

REDUCES "DRAW-OFF" LOSS In domestic hot water systems an often overlooked but important loss of heat occurs when the water in a pipe between the heater and the faucet, which has cooled to room temperature, is drawn off to obtain hot water. Every gallon of this water represents an expenditure in fuel consumed to heat it. Furthermore, the pipe itself has cooled and must be reheated by the new supply of hot water.

A recent investigation has disclosed that fuel bills for domestic hot water can be reduced as much as 38%, and have averaged 20%, when iron pipe has been replaced with direct runs of smaller sized copper tubing. At commonly found water pressures, Revere Copper Water Tube in 1/4" nominal size will deliver sufficient water in many cases.

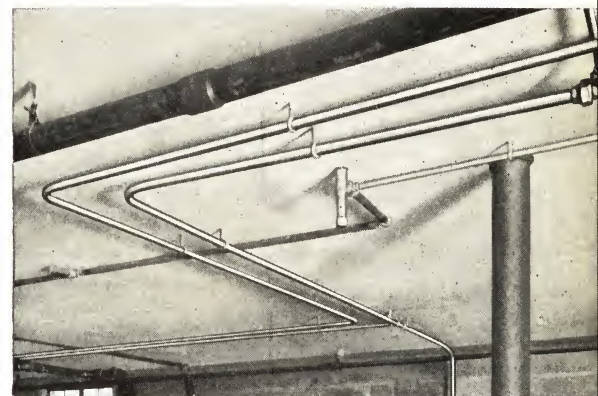
In many houses recently built, special lines are run directly from the heater to the kitchen, and sometimes the bathrooms in order to take advantage of these savings.



Streamline Fittings require less space, being only slightly larger than the pipe itself. They can also be installed much closer to walls, ceilings, etc., and in places otherwise inaccessible because no room is required for wrench grip or wrench swing.



Basement — modern style. Note air-conditioning ducts and steel joist construction with reinforced concrete arch. Along with these up-to-the-minute materials, 4000 lbs. of Revere Copper Water Tube, 1/2" to 3", joined with Streamline Solder Fittings, were used for all water lines.



An installation of Revere Copper Water Tube (Hard Temper) with compression fittings. Note the straight runs and the smooth bends made with a bending tool.



USES OF REVERE COPPER WATER TUBE

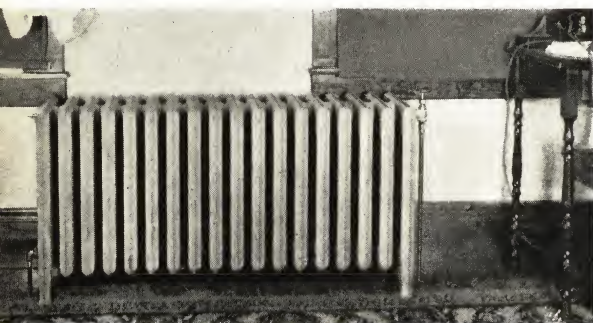
FOR HEATING



The supply lines in a forced circulation hot water heating system include one 1" and one $\frac{3}{4}$ ", and the return line one 1" Revere Copper Water Tube (Type M) and Streamline Fittings. Circulator requirements are 7 gallons per minute against a 24-inch head. The job was figured for 365 feet of direct cast iron radiation.



The basement piping includes Revere Copper Water Tube in sizes 1"— $\frac{3}{4}$ "— $\frac{1}{2}$ "— $\frac{3}{8}$ " and $\frac{1}{4}$ ". Note the copper wire used for hangers, and the neat, compact connections made with Streamline Fittings. Even with the added advantages of forced circulation and thermostatic control the actual cost of this Copper Water Tube installation was only slightly more than the cost of a steel pipe gravity installation which did not include these desirable features.



A radiator in the above home showing supply and return connections $\frac{3}{8}$ " Revere Copper Water Tube (Type M) assembled with Streamline Soldered Fittings. The heating contractor was Leonard P. Hoffmeister of Syracuse. Material was supplied through the Crane Company branch at Syracuse.

Within the last few years architects, engineers and heating contractors throughout the United States, realizing the advantages of copper tube for plumbing purposes, have installed both steam and hot water house heating systems, using copper tube for all piping. The recorded results prove copper tube is entirely satisfactory. Copper not only conveys the steam and water without leakage, but also eliminates most of the troubles from corrosion and dirt that made traps, valves and other specialties inoperative at times. Copper tube also helps to avoid dirty boiler water because copper forms no rust to foul or discolor the water. It also is recognized that the smooth inside finish of copper tube with flush fittings creates less resistance to the flow of steam or water than threaded pipe.

An easy uninterrupted flow through the pipe lines of a heating system is even more vital to the success of the system than to that of a plumbing installation. In a plumbing system there is usually ample pressure behind the water to give a forcible flow. In heating systems, the pressure behind steam is usually less than two pounds per square inch. The pressure which makes hot water move through a hot water house heating system is extremely low where no pump is used. Many systems operate by gravity circulation only. The least resistance retards and in certain cases may entirely stop circulation.

STEAM SYSTEMS In general, copper tube sizes for steam heating installations may be the same as standard iron pipe. While the inside diameter of copper tube is usually slightly smaller than that of iron pipe of the same nominal size, this difference is compensated for by the smoother interior and freedom from pockets at fittings, when copper tube is used.

While it is common practice to use iron pipe capacities when laying out steam systems with copper tubing, it is possible to obtain good results by estimating slightly greater capacities for certain copper tube sizes, such as allowing 5 to 10% on the 1, $1\frac{1}{4}$ and $1\frac{1}{2}$ inch sizes; 15% on the 2, 3, $3\frac{1}{2}$ and 4 inch sizes; and 24% on the $2\frac{1}{2}$ inch size.

Copper Water Tube is particularly recommended for steam return lines where the greatest amount of corrosion takes place and which frequently fail through rust after a comparatively short period of service.

HOT WATER SYSTEMS While copper tubes have proved successful in steam heating, it is in hot water heating systems, especially those employing a circulator, that copper tubes and solder fittings are most effective and most economically used. In forced circulation hot water heating systems, circulation is speeded by a noiseless electric pump. Smaller pipe sizes are used and it is therefore particularly important that there be no hindrance to flow. The smooth interior surface of Copper Water Tube reduces flow resistance to a minimum and it is estimated that there is 10 to 15% greater velocity circulation in copper with the same circulating head. This, plus the fact that heat losses are less with copper, results in increased circulation and the maximum amount of heat is delivered to the radiators in the least possible time.

HEAT LOSSES AND INSULATION While the total heat loss from both convection and radiation of copper is approximately 50% of that of black iron pipe of the same nominal size, it is considered good practice to cover copper tubing with the same thickness of insulation as would be required for iron or steel pipe

under the same conditions. Where the temperature difference of the tube and surrounding still air is relatively high, complete insulation is economically justified. However in the installation of a forced circulation hot water heating system, where the runs are approximately 125 feet in length or less and where the temperature of the air in the vicinity of the mains is not less than 50°, the use of pipe covering is frequently eliminated. The above conditions are found in the average private residence type of dwelling.

When copper tube is left uncovered, it is customary to clean it and finish it with one coat of bright lacquer. This prevents the tube from tarnishing, adds to its appearance and tends to reduce heat losses.

FOR AIR CONDITIONING

Revere Copper Tube is extensively used in air conditioning work for water lines leading to and from condenser coils of compressor units; from condensate pans of room coolers; and to and from humidifier spray chambers. Also for refrigerant lines between compressor and cooling units. Freedom from rusting, and resistance to corrosion are of course basic considerations leading to the practically universal use of copper tube for these purposes.

FOR DRAINAGE

Revere Copper Water Tube and Streamline Drainage Fittings may be advantageously used for all waste and vent piping systems. Standard Streamline Plumbing Fittings are suitable for all vent piping and for some applications of waste piping.

Advantages of Revere Copper Water Tube and Streamline Fittings in drainage work, aside from those previously mentioned, include:

Smooth interior surface eliminates tendency to clog.

Streamline Fittings, with inside shoulder of same wall thickness as tube, avoid recesses which cause friction and clogging.

Alternate filling and emptying of drainage lines promote corrosion; copper resists corrosive action.

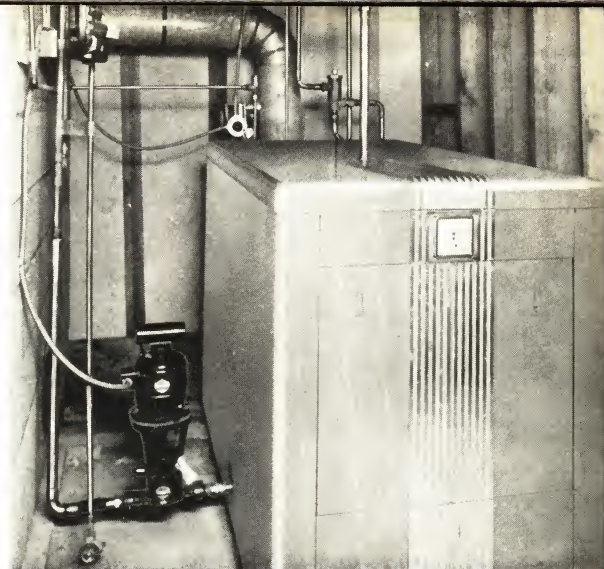
Copper tube has high thermal conductivity, is warmed quickly when hot water passes through it, and permits grease to flow through in a liquid state, reducing tendency to clog.

An entire drainage system of Revere Copper Water Tube and Streamline Fittings for a bathroom may be assembled on a work bench, roughed into place and connected to fixtures.

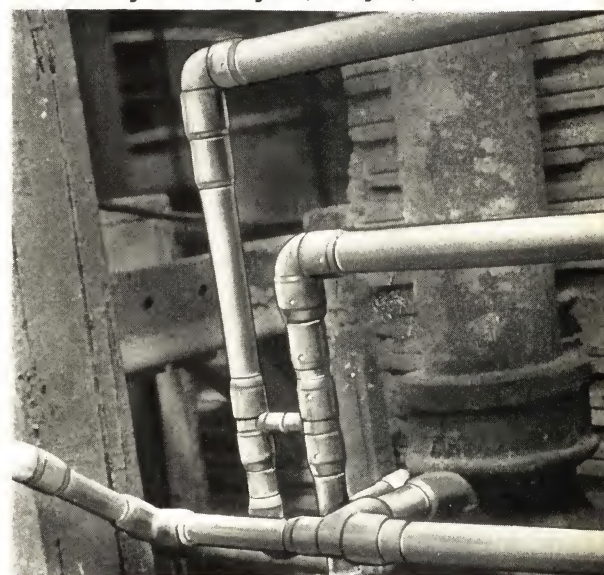
Valuable space is saved and work can be installed in tight spaces quickly and easily.

FOR MODERNIZATION WORK

Revere Copper Water Tube is adaptable to modernization work for water lines, hot water heating, steam heating and drainage lines in a wide variety of applications. It has been used satisfactorily in large apartment houses, hotels, office buildings and large and small residences. In each, Revere Copper Water Tube was selected to replace rustable pipe that had failed in service. Owners, architects, engineers and contractors now recognize that replacement work can be done more economically than is possible with other types of pipe, because attendant costs of carpentry, masonry, painting, etc., are greatly reduced. Moreover, a Revere Copper Water Tube installation usually means that the piping in a building has been replaced for the last time—and can be forgotten.



Note the small sizes of copper tube used in this forced circulation hot water heating system. Architect: Emil H. Kleeman, Newark. Plumbing and Heating Contractors: Northfield Plumbing and Heating Co., Livingston, N. J.



In drainage work, clogging by sediment is prevented and the flow is uninterrupted because the bore of Revere Copper Water Tube is the same as that of the Streamline Solder Fittings.



Replacing worn-out rustable pipe with Revere Copper Water Tube in Union Central Building, Cincinnati, Ohio. Over 12,000 ft. of tube installed with no interruption to business.





The flexibility of Revere Copper Water Service Tube (Type K, Soft Temper) saved time and simplified installation on this job. This 100-foot trench was dug through very rocky soil, which caused many curves, but this pure copper was bent right around them.



Part of an extensive Lawn Irrigation System installed with Revere Copper Water Tube.



Tanks to burner connections are quickly made with flexible Revere Copper Tube.

FOR UNDERGROUND SERVICE

Revere Copper Water Tube is an ideal material for underground service use for water and gas from main to building, for oil from tank to burner, for underground lawn irrigation systems, etc.

It meets every requirement for this type of installation including (1) resistance to internal corrosion from the liquid or gas; (2) resistance to external corrosion from the soil; (3) reduction of the danger of bursting in case of freezing; (4) freedom from contamination of liquid or gas being conveyed; (5) no reduction in flow due to rust; (6) freedom from breakage due to vibration or settling of the ground; (7) freedom from splitting, flattening or cracking under pressure; (8) trouble-free service under normal conditions.

WATER SERVICE Lines from the water main to the building are of great importance. From the standpoint of the building owner, if they fail to deliver a full flow of water, his piping system inside the building fails to function properly. If the pipe leaks, not only must the cost of replacing it be considered, but it is quite likely that lawns will be torn up, pavements ripped up, etc.

From the standpoint of the water company or city, if there is a small unseen leak, valuable water is wasted and, as stated before, pavements have to be torn up and replaced. Such lines require a non-rusting and sanitary pipe which, when placed underground, can be forgotten.

Revere Copper Water Tube (Type K, Soft Temper) in our opinion more nearly meets all of the requirements for water services than any other type of pipe. Its use is justified from the standpoint of the material itself. This makes for long life and trouble-free service, and permits methods of installation which, in addition to the foregoing, result in economical first cost.

IRRIGATION Concealed sprinkling systems for lawns, gardens, parks, school grounds, athletic fields and golf courses are rapidly gaining favor because it has been proved that, in those sections of the country where we have long, hot, dry spells during the summer, the use of such systems can be actually justified on an economy basis. There is no comparison between copper and other piping lines when the appearance and condition of turf, corrosion, long life, ease of installation, etc., are considered.

Two necessities of first importance in underground installations are freedom from servicing and freedom from danger of bursting caused by accidental freezing. When copper tube is used it will not be found necessary to tear up the lawn which it helped to beautify. Likewise, if, through unforeseen severity, there should be accidental freezing when copper is used, the danger of bursting is greatly reduced.

FUEL OIL LINES Revere Copper Tube, Soft Temper, is standard for fuel oil lines from tank to burner. It cannot rust and is resistant to corrosion from oil and soil. Being flexible, the tube can be bent to meet installation needs; the flexibility also allows for tank settling without straining or breaking connections. Permanently tight, vibration-proof connections are made with compression or Streamline Soldered Fittings. Type U Copper Tube, also Type K Copper Tube, Soft Temper in sizes from $\frac{3}{8}$ " to 2" inclusive, meet the requirements of the National Board of Underwriters for fuel oil services.

STANDARD DIMENSIONS • WEIGHTS • PROPERTIES

REVERE COPPER WATER TUBE

TYPES		SIZE IN INCHES		Wall Thickness in Inches	Inside Diameter in Inches	I. D. Area in Square Inches	Test Pressure in Pounds Minimum	Weight in Pounds Per Foot
USES — RECOMMENDATIONS — DATA		Nominal	O. D.					
TYPE K		$\frac{1}{4}$	.375	.032	.311	.076	1000	.133
Temper Hard Soft	Working Pressure * 400 lbs. * 250 lbs.	$\frac{3}{8}$	.500	.049	.402	.127	1000	.269
		$\frac{1}{2}$	.625	.049	.527	.218	1000	.344
		$\frac{5}{8}$	.750	.049	.652	.333	1000	.418
		$\frac{3}{4}$	.875	.065	.745	.436	1000	.641
		1	1.125	.065	.995	.778	780	.839
*Steam (saturated) up to 80 lbs. gauge or 325° F.		$1\frac{1}{4}$	1.375	.065	1.245	1.217	630	1.040
For Underground Services, General Plumbing Purposes, Severe Water Conditions. Also Gas, Steam, Oil Lines and Industrial Uses.		$1\frac{1}{2}$	1.625	.072	1.481	1.723	580	1.360
Hard or Soft in straight 20 ft. lengths.		2	2.125	.083	1.959	3.014	510	2.060
Soft in 30 ft., 45 ft. and 60 ft. coils.		$2\frac{1}{2}$	2.625	.095	2.435	4.657	470	2.920
Coiling over $1\frac{1}{4}$ in. size not recommended.		3	3.125	.109	2.907	6.637	450	4.000
Bending — Hard or Soft by machine.		$3\frac{1}{2}$	3.625	.120	3.385	8.999	430	5.120
Soft by hand.		4	4.125	.134	3.857	11.684	420	6.510
		5	5.125	.160	4.805	18.133	400	9.670
		6	6.125	.192	5.741	25.886	400	13.870
		8	8.125	.271	7.583	45.162	400	25.900
		10	10.125	.338	9.449	70.123	400	40.260
		12	12.125	.405	11.315	100.554	400	57.760
TYPE L		$\frac{1}{4}$	.375	.030	.315	.078	1000	.126
Temper Hard Soft	Working Pressure * 250 lbs. * 150 lbs.	$\frac{3}{8}$	.500	.035	.430	.145	1000	.198
		$\frac{1}{2}$	.625	.040	.545	.233	1000	.285
		$\frac{5}{8}$	.750	.042	.666	.348	1000	.362
		$\frac{3}{4}$	.875	.045	.785	.484	1000	.455
		1	1.125	.050	1.025	.825	880	.655
*Steam (saturated) up to 80 lbs. gauge or 325° F.		$1\frac{1}{4}$	1.375	.055	1.265	1.257	780	.884
For General Plumbing Purposes. Suitable for normal Water Conditions. Also Gas, Steam, Oil Lines and Industrial Uses.		$1\frac{1}{2}$	1.625	.060	1.505	1.779	720	1.140
Hard or Soft in straight 20 ft. lengths.		2	2.125	.070	1.985	3.095	640	1.750
Soft in 30 ft., 45 ft. and 60 ft. coils.		$2\frac{1}{2}$	2.625	.080	2.465	4.772	580	2.480
Coiling over $1\frac{1}{4}$ in. size not recommended.		3	3.125	.090	2.945	6.812	550	3.330
Bending — Hard, not recommended.		$3\frac{1}{2}$	3.625	.100	3.425	9.213	530	4.290
Soft by hand or machine.		4	4.125	.110	3.905	11.977	510	5.380
		5	5.125	.125	4.875	18.666	460	7.610
		6	6.125	.140	5.845	26.832	430	10.200
		8	8.125	.200	7.725	46.869	430	19.290
		10	10.125	.250	9.625	72.760	430	30.040
		12	12.125	.280	11.565	105.047	430	40.360
TYPE M		$\frac{1}{4}$	.375	.025	.325	.083	1000	.106
Temper Hard	Working Pressure * 250 lbs.	$\frac{3}{8}$	.500	.025	.450	.159	1000	.144
		$\frac{1}{2}$	.625	.028	.569	.254	890	.203
		$\frac{5}{8}$	.750	.030	.690	.373	800	.263
		$\frac{3}{4}$	.875	.032	.811	.517	710	.328
		1	1.125	.035	1.055	.874	600	.464
*Steam (saturated) up to 80 lbs. gauge or 325° F.		$1\frac{1}{4}$	1.375	.042	1.291	1.309	590	.681
For General Plumbing Purposes with soldered fittings only. Suitable for normal Water Conditions. Also Gas, Steam, Oil Lines and Industrial Uses.		$1\frac{1}{2}$	1.625	.049	1.527	1.831	580	.940
Hard in straight 20 ft. lengths.		2	2.125	.058	2.009	3.170	520	1.460
Bending not recommended either by hand or machine.		$2\frac{1}{2}$	2.625	.065	2.495	4.889	470	2.030
		3	3.125	.072	2.981	6.979	440	2.680
		$3\frac{1}{2}$	3.625	.083	3.459	9.397	430	3.580
		4	4.125	.095	3.935	12.161	430	4.660
		5	5.125	.109	4.907	18.911	400	6.660
		6	6.125	.122	5.881	27.164	370	8.910
		8	8.125	.170	7.785	47.600	370	16.460
		10	10.125	.212	9.701	73.914	370	25.570
		12	12.125	.254	11.617	105.993	370	36.690
TYPE O		3	3.125	.049	3.027	7.196	180	1.830
Temper Hard	Working Pressure 125 lbs.	$3\frac{1}{2}$	3.625	.049	3.527	9.770	180	2.130
		4	4.125	.058	4.009	12.623	180	2.870
		5	5.125	.065	4.995	19.596	180	4.000
		6	6.125	.072	5.981	28.096	180	5.310
		8	8.125	.083	7.959	49.752	180	8.120
For Industrial Use only such as Paper Mill and other process applications. May be used for low pressure steam.		10	10.125	.109	9.907	77.086	180	13.280
		12	12.125	.134	11.857	110.418	180	19.550
TYPE U		—	.250	.049	.152	.018	1000	.120
Temper Soft	Working Pressure 250 lbs.	—	.3125	.049	.2145	.036	1000	.157
		—	.375	.049	.277	.060	1000	.195
		—	.4375	.049	.3395	.090	1000	.233
		—						
For Oil Burner Use. Listed by Underwriters' Laboratories, Inc., under "Gas Tubing" for tank to burner oil service and for oil burner manufacture and assembling purposes. (Note Type K, sizes $\frac{3}{8}$ " to 2" inclusive, is also listed for this service.) Furnished in 50 ft. coils.		† Also Type K, sizes $\frac{3}{8}$ " to 2" inc. are approved						



PIPE

BRASS AND COPPER

For more than 38 years, Revere Copper and Brass Incorporated has manufactured brass and copper pipe for commercial and residential use. The average installation of these products has shown a surprisingly low cost for maintenance and repairs. In fact, many of the installations of 20 to 30 years ago have required no attention whatever in the way of service or repairs.

Every precaution in the way of laboratory control, close inspection and tests during manufacture is taken to safeguard the quality of Revere Brass Pipe.

THE ECONOMY OF BRASS AND COPPER PIPE

Brass pipe's greater endurance, longer life, resistance to corrosion and greater permanent value constitute ultimate economies of great importance.

The cost of ripping out and replacing piping installations is far in excess of the slight saving in first cost effected by using rustable material. In fact, a survey shows that, at the end of slightly over four years, the cost of rustable pipe begins to exceed that of brass pipe and that in a twenty-year period, because of repairs and renewal, the cost of rustable pipe is frequently five times that of brass pipe.

ALLOWANCE FOR RUST CLOGGING ELIMINATED

When rustable pipe is specified for plumbing, allowance must be made for rust-clogging. Therefore a larger size pipe is necessary than for the same installation when copper or brass pipe is used. Thus the difference in first cost between these pipes is not large enough to be an appreciable factor in total cost of an installation.



Memorial Hospital for the Treatment of Cancer and Allied Diseases, New York City. Over 200,000 pounds of Revere Red Brass Pipe were used in this job for hot and cold water lines. Other Revere products included Copper Water Tube for heating lines and Cheney Flashing. James Gamble Rogers and Henry C. Pelton, Associated Architects; Vermilya Brown Co., Inc., General Contractors; J. L. Murphy, Inc., Plumbing Contractor.

REVERE BRASS PIPE (Yellow Brass)

Revere Brass Pipe (Yellow Brass) is seamless, semi-annealed, and free threading. It is a clean yellow-gold in color with a fine smooth finish. Each length is stamped "Revere" as a means of identification and a guarantee of quality.

This pipe is intended for waters normally corrosive. The selection of pipe should depend on local water conditions. No definition that is all inclusive can be given for a normal water. However, the following conditions are indicative of normalcy in a water supply: Low permanent hardness, a fair degree of temporary hardness, low carbonic acid content and relatively high alkalinity.

The majority of waters in the United States fall into this group. Thus, Revere Brass Pipe provides long-lived, trouble-free service in a large percentage of the towns and cities in this country, for both hot and cold water lines.

If there is any doubt about the corrosiveness of the water, an analysis should be made so that a correct grade of pipe may be installed. The making of such an analysis is offered free of charge to architects, engineers, and plumbing contractors.

Revere Brass Pipe has a long record of satisfactory service in all sections of the United States and in all types of buildings. This pipe possesses excellent working and threading qualities, and is fully guaranteed by the manufacturer not to split or to be in any way defective when shipped.

It is made in two mixtures, one containing approximately 60% copper and the other 67% copper. These grades of pipe meet the following specifications:

60% Copper—A. S. T. M. Specifications B43-33 (Muntz Metal); Federal Standard Specifications WW-P-351, Grade "C."

67% Copper—A. S. T. M. Specifications B43-33 (High Brass); Federal Standard Specifications WW-P-351, Grade "B"; and Navy Department Specification 44P12, Grade "B."

Revere Brass Pipe is reasonably priced, the cost being slightly less than that of Revere Red-Brass Pipe.

REVERE RED BRASS PIPE (85% Copper)

Revere Red-Brass Pipe (85% copper) distinguished by its copper-bronze color, possesses extraordinary resistance to corrosion. It is readily threaded and easily worked. Each length is stamped "Revere Red-Brass" as a means of identification and a guarantee of quality.

This pipe is designed for use with abnormally corrosive waters and should always be used where there is high sulphur and carbon-dioxide content or where heavy chlorination is necessary to insure purity and for all installations in contact with soil or cinder concrete.

Waters drawn from sources of peaty origin, shallow wells, tubular wells or filter galleries in lowlands along river beds ordinarily fall in the class of extremely corrosive waters.

Aerial view of downtown Cincinnati in which a list of Revere Brass Pipe installations reads like a directory of the city's finest buildings.

Starrett's Netherland Plaza and Carew Tower
Union Central Building
Union Central Building Annex
Dixie Terminal Building
Union Trust Building
Fountain Square Office Building
Hotel Gibson
The Sinton-St. Nicholas Hotel
The H. & S. Pogue Co. Department Store
The Enquirer Building
Doctors' Building
The Cincinnati Club
Hotel Metropole (Addition)
Cincinnati & Suburban Bell Telephone Co. Building
Young Women's Christian Association Building
Brotherhood of Railway & Steamship Clerks' Building
The Gwynne Building
Duttenhofer Building



Revere Red-Brass Pipe can also be used for salt (sea) waters used in baths and swimming pools. (However, Admiralty Tube is generally preferred for this service.) In fact, where the utmost is demanded from a pipe obtainable commercially at a reasonable cost Revere Red-Brass Pipe should be used.

It is advisable to consider the use of this pipe wherever possible regardless of the present condition of the water supply, as a safeguard against possible changes in corrosiveness due to future changes in source of supply, or purification methods.

Revere Red-Brass Pipe is guaranteed not to split or in any way be defective when shipped.

Revere Red-Brass Pipe meets the following specifications: Federal Standard Specifications WW-P-351, Grade "A"; and Navy Department Specification 44P12, Grade "A"; A. S. T. M. Specifications B43-33 (Red Brass).

REVERE COPPER PIPE (Standard Pipe Size)

Revere Copper Pipe is made of 99.9% pure copper in Standard Pipe Size. Each length is stamped "Revere" as a means of identification and a guarantee of quality.

Revere Copper Pipe, like Revere Red-Brass Pipe, is made primarily for extra-corrosive waters. It is not in as general use as Red-Brass Pipe, but is preferred in certain cities and it gives utmost satisfaction. Pure copper pipe is used also for industrial piping where it withstands severe service.

The above pipe meets the following specifications:

A. S. T. M.—B42-33; Federal Standard Specifications No. WW-P-377; and Navy Department Specification 44P2.

STANDARD BRASS PIPE SIZES Brass, Red-Brass and Copper Pipe



New York State Water Amphitheatre, New York State World's Fair Commission. Stage is surrounded by a moat.

Revere Red Brass Pipe were used in sizes from 4 inch to $\frac{3}{8}$ inch.

Architect: Sloan and Robertson; General Contractor: Psaty and Fuhrman, Inc.; Plumbing Contractor: John Weil Plumbing Co., all of New York City.

Pipe Size	Dimensions in Inches			Pounds per Foot		
	O. D.	I. D.	Wall	Brass	Red-Brass	Copper
$\frac{1}{8}$	.405	.281	.0620	.246	.253	.259
$\frac{1}{4}$	.540	.375	.0825	.437	.450	.460
$\frac{3}{8}$	.675	.494	.0905	.612	.630	.643
$\frac{1}{2}$	.840	.625	.1075	.911	.938	.957
$\frac{3}{4}$	1.050	.822	.1140	1.24	1.27	1.30
1	1.315	1.062	.1265	1.74	1.79	1.83
$1\frac{1}{4}$	1.660	1.368	.1460	2.56	2.63	2.69
$1\frac{1}{2}$	1.900	1.600	.1500	3.04	3.13	3.20
2	2.375	2.062	.1565	4.02	4.14	4.23
$2\frac{1}{2}$	2.875	2.500	.1875	5.83	6.00	6.14
3	3.500	3.062	.2190	8.31	8.56	8.75
$3\frac{1}{2}$	4.000	3.500	.2500	10.85	11.17	11.41
4	4.500	4.000	.2500	12.29	12.66	12.94
$4\frac{1}{2}$	5.000	4.500	.2500	13.74	14.15	14.46
5	5.563	5.062	.2500	15.40	15.85	16.21
6	6.625	6.125	.2500	18.44	18.99	19.41
7	7.625	7.062	.2815	23.92	24.63	25.17
8	8.625	8.000	.3125	30.05	30.95	31.63
9	9.625	8.937	.3440	36.94	38.03	38.88
10	10.750	10.019	.3655	43.91	45.20	46.22
11	11.750	11.000	.3750	49.37	50.81	51.94
12	12.750	12.000	.3750	53.71	55.29	56.51

INSTALLATION DATA FOR COPPER AND BRASS PIPE AND TUBE*

For hot and cold water lines in plumbing installations pipe and tube sizes are not usually definitely fixed by codes. The sizes are generally left up to plumbing engineers and contractors who figure them out to satisfy the maximum water demand. Determining correct sizes for ordinary plumbing installations with ordinary mains, ordinary branches, ordinary fixture demands, etc., is an easy matter. Certain tables in common use in the trade, which have been demonstrated by experience in successful installations to be satisfactory, may act as a guide, and the results from them are usually reasonably accurate. But for unusual installations such as large or complex systems, or where unusually long mains

are required, correct tube or pipe sizes can only be determined by the use of intricate formulas, or comprehensive tables which have been laboriously worked out to save the time of designers, and to help them to escape errors that so often arise in the working out of pipe sizes by formulas.

In the design of hot and cold water supply systems for small and large buildings correct tube sizes must be selected. The pipes should be proportioned just right so that none will be so small that the water supplied by them will not be ample, and so that none will be too large, which would be unnecessarily expensive. Tubes too large, and too small, represent bad design.

SIZE SELECTION—When Iron Pipe Sizes Are Known

From many years' experience on a variety of work, it would appear that smaller sizes of copper tube and brass pipe may be used than is common practice in iron-pipe installations. This is true because no allowance need be made for loss of head due to the

accumulation of rust. Thus, if the correct sizes are known for iron pipe, due allowance being made for rust, etc., the data given in Table 1 may be used to select the correct size of copper tube and Table 1A for brass pipe.

TABLE 1—For Copper Water Tube

IRON PIPE Nominal Diameter	CORRESPONDING SUITABLE SIZES FOR COPPER TUBE	
	Hot Water	Cold Water
1/2 inch	3/8 inch	3/8 inch
3/4 inch	1/2 inch	1/2 inch
1 inch	3/4 inch	3/4 inch
1 1/4 inch	1 inch	1 inch
1 1/2 inch	1 inch	1 1/4 inch
2 inch	1 1/4 inch	1 1/2 inch
2 1/2 inch	1 1/2 inch	2 inch
3 inch	2 inch	2 1/2 inch

TABLE 1A—For Brass Pipe

IRON PIPE Nominal Diameter	CORRESPONDING SUITABLE SIZES FOR BRASS PIPE	
	Hot Water	Cold Water
1/2 inch	1/2 inch	1/2 inch
3/4 inch	1/2 inch	1/2 inch
1 inch	3/4 inch	3/4 inch
1 1/4 inch	1 inch	1 inch
1 1/2 inch	1 inch	1 1/4 inch
2 inch	1 1/4 inch	1 1/2 inch
2 1/2 inch	1 1/2 inch	2 inch
3 inch	2 inch	2 1/2 inch

SIZE SELECTION—When Iron Pipe Sizes Are Not Known

If the correct sizes for an iron-pipe installation are not known, the method of selection of copper tube sizes is to first determine

approximately the required flow per minute, by reference to Table 2.

TABLE 2

FIXTURES	RATE OF FLOW (Gallon per Minute)
Each Bath	8-10
Lavatory	5- 8
Tank Closet	3- 5
Flush Valve Closet	30-40
Shower	5- 8
Sink	8-10
Laundry Tub	8-10
Garden Hose	5-10

The rate of flow in Table 2 is that through the branches to the fixtures. In baths, lavatories, sink and laundry tubs, the rate is for both hot and cold running at the same time. To compute the rate of flow through mains which supply numerous fixtures, the total rate will be less than that found by Table 2, because all fixtures will not be running at the same time.

The rate of flow in mains may as a rule be closely approximated by dividing the total found by Table 2 by four for residences, apartments, schools, office buildings and other edifices of a similar water-consuming character. For clubs and hotels divide by three. For gymnasiums, hospitals, public comfort stations and similar water-consuming structures divide by two. For public baths, laundries and factories allow the full amount shown in the table.

Commonly Used Branch Sizes

The sizes of pipes commonly used as branches to fixtures vary somewhat with the pressures at the fixture levels and are approxi-

mately as in Table 3 for copper tube and 3A for brass pipe.

TABLE 3—Sizes of Copper Tube Water Supply Short Branches to Plumbing Fixtures

FIXTURE	PRESSURES		
	High Over 60 lbs.	Medium 30 to 60 lbs.	Low Under 30 lbs.
To Baths	1/2 inch	3/4 inch	3/4 inch
Lavatories	3/8	1/2	1/2
Tank Closets	3/8	3/8	1/2
Valve Closets	1	1	1 1/4
Pantry Sinks	1/2	1/2	1/2
Kitchen Sinks	1/2	1/2	3/4
Slop Sinks	1/2	3/4	3/4
Showers	1/2	1/2	3/4
Urinals (Flush Tank)	1/2	3/4	3/4
Urinals (Flush Valve)	3/4	3/4	3/4
Drinking Fountains	3/8	3/8	1/2

TABLE 3A—Sizes of Brass Water Supply Short Branches to Plumbing Fixtures

FIXTURE	PRESSURES		
	High Over 70 lbs.	Medium 40 to 70 lbs.	Low Under 40 lbs.
To Baths	1/2 inch	3/4 inch	1
Lavatories	3/8	1/2	1/2
Tank Closets	3/8	1/2	1/2
Valve Closets	3/4	1	1 1/4
Pantry Sinks	3/8	1/2	1/2
Kitchen Sinks	1/2	3/4	3/4
Slop Sinks	1/2	3/4	3/4
Showers	3/8	1/2	3/4
Urinals	1/2	3/4	3/4
Fountains	3/8	3/8	1/2

*From Copper Tube Handbook, published by Copper and Brass Research Association



INSTALLATION DATA

After finding the rate of flow by Table 2 and dividing for different classes of buildings, the sizes of the water mains in a building may be determined from Tables 4 and 4A. These tables state the approximate quantities of water that various sizes of copper tubes and brass pipes will deliver under various pressure drops. These are conservative values

for everyday use and make some allowance for fittings, etc. We recommend the adoption of a pressure drop not exceeding 20 pounds per 100 feet, to reduce noise to a practical minimum. As a matter of fact, systems designed for a ten-pound pressure drop are considered preferable for domestic installations.

TABLE 4—Approximate Delivery of Copper Tubes in U. S. Gallons per Minute.
S=Deliveries through short lines, less than 15 ft. L=Delivery through lines approximately 100 ft. long.

PRESSURE DROP (lbs.)	3/8"		1/2"		5/8"		3/4"		1"	
	S	L	S	L	S	L	S	L	S	L
5	3	0.7	6	2	10	3	14	5	35	11
10	4	1.0	10	3	17	5	25	7	50	17
20	6	2.0	14	4	24	7	35	11	70	25
30	8	2.5	16	5	30	9	45	14	90	30
40	9	2.7	18	6	36	11	55	17	100	35
50	10	3.0	20	7	42	13	65	20	110	40

PRESSURE DROP (lbs.)	1 1/4"		1 1/2"		2"		2 1/2"		3"	
	S	L	S	L	S	L	S	L	S	L
5	70	20	100	35	200	75	400	150	700	200
10	100	30	150	50	325	110	600	225	1000	300
20	150	45	215	75	500	165	900	300	1500	500
30	180	60	275	95	600	200	1100	350	1800	600
40	220	70	310	115	700	250	1300	450	2200	700
50	240	80	350	130	800	280	1500	500	2500	800

TABLE 4A—Approximate Deliveries of Brass Pipe in U. S. Gallons per Minute
Length 100 feet

PRESSURE DROP (lbs.)	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"
17	3.2	9.1	18.7	33.5	51.6	105.8	200.0	290.0	589.0
30	5.0	13.8	28.3	52.0	78.0	159.7	308.0	436.0	885.0
40	5.8	15.9	32.7	60.0	90.0	184.4	350.0	504.0	1023.0
50	6.5	17.5	36.6	70.0	100.7	206.2	390.0	564.0	1143.0
60	7.0	19.5	40.0	76.0	110.3	225.9	430.0	617.0	1252.0
75	7.5	21.8	44.8	85.0	123.4	252.6	480.0	690.0	1400.0
100	9.0	25.2	51.7	99.0	142.4	291.6	558.0	797.0	1617.0

In proportioning piping it is also good practice to bear in mind the relative sizes and numbers of branches that can be adequately served by a main of a given size. Table 5 will be found useful for checking this.

While these tables may be considered quite reliable for the average plumbing installation, there may arise cases where a special study should be made of the conditions and requirements, and the piping proportioned by hydraulic formulas or from more comprehensive tables which are available to the trade and contain engineering data covering practically all conditions that may arise in plumbing practice.

TABLE 5 Relative Sizes of Branches and Water Mains

Size of Main	Number and Size of Branches Main Will Supply— Running Full
1/2"	Two — 3/8"
3/4"	Two — 1/2"
1"	Two — 3/4"
1 1/4"	Two — 1" or One — 1" and Two — 3/4"
1 1/2"	Two — 1 1/4" or One — 1 1/4" and Two — 3/4"
2"	Two — 1 1/2" or One — 1 1/2" and Two — 1 1/4"
2 1/2"	Two — 1 1/2" and Two — 1 1/4" or One — 2" and Two — 1 1/4"
3"	One — 2 1/2" and One — 2" or Two — 2"
3 1/2"	Two — 2 1/2" and Two — 1 1/2" or One — 3" and One — 2" or Four — 2"
4"	One — 3 1/2" and One — 2 1/2" or Two — 3" or Three — 2 1/2" and One — 2" or Six — 2"

ALLOWANCE FOR EXPANSION

In laying out brass and copper pipe and tube installations, allowance must be made for the fact that copper tube expands approximately 50% and brass pipe 60% more than iron or steel pipe for equal temperature rises. Where piping, as in the open and the runs are short it is not difficult to avoid trouble from expansion and contraction.

For copper tube an expansion bend made of soft temper tube or a loop assembled with hard temper tube and elbows should be provided. One of the many types of bends is shown at the right.

For brass pipe several methods of providing for expansion are shown at the bottom of page 19. Special care should be exercised where long runs or risers are rigidly anchored to supporting members.



SUGGESTED SPECIFICATIONS

FOR COPPER WATER TUBE

TUBE (PIPING) The roughing-in of all (cold water lines) (hot water lines and recirculating piping) (steam and return piping) shall be done with Type (K) (L) (M) REVERE COPPER TUBE of standard weight and thickness, and shall include all labor and material necessary for a complete installation; lines shall be properly supported to prevent swinging or sagging and shall run true and plumb in an approved workmanlike manner in complete accordance with the manufacturer's instructions, subject to the complete approval of the (architect) or his authorized representative.

FITTINGS, SOLDERED All soldered fittings shall be of the Streamline Pipe and Fittings Company's manufacture or equal and approved, and installed on REVERE COPPER TUBE in complete accordance with manufacturer's directions, and as written above under "Tube."

FITTINGS, COMPRESSION All compression fittings shall be of the Hays Manufacturing Company's manufacture or equal and approved, and installed on REVERE COPPER TUBE in complete accordance with manufacturer's directions, and as written above under "Tube."

Additional specification data to be included, if desired.

SUPPLY LINES All main supply, return and branch piping shall be (installed with) REVERE COPPER TUBE as manufactured by Revere Copper and Brass Incorporated, to carry (cold water) (hot water) (including recirculating) (steam main and returns).

NOTE: Follow the above specifications for oil, gas or other liquids and solutions containing no corrosive elements.

HARD TUBE All rigid hard temper tube shall be used for all mains, returns, risers, recirculating lines and branches, where shown or detailed; shall be REVERE COPPER TUBE, HARD TEMPER, and shall always be bent with a bending tool in accordance with tube manufacturers' instructions.

SOFT TUBE Soft temper tube shall be used for all branches and short runs where flexible tube is practicable, or where shown, detailed or required; shall be REVERE COPPER TUBE, SOFT TEMPER, capable of being bent or flexed into position by hand.

FOR BRASS OR COPPER PIPE

SUPPLY LINES All hot and cold water supply lines and all branches to plumbing fixtures shall be of Revere Brass Pipe (or Revere Red-Brass Pipe or Copper Pipe) manufactured by Revere Copper and Brass Incorporated. Each length shall have "Revere" (or "Revere Red-Brass") stamped in the metal and shall be guaranteed by the manufacturer not to split or to be in any way defective when shipped.

FITTINGS All fittings shall be of substantial beaded construction, free from flaws and with threads tested, and within the following limits as to the composition of the four elements—copper, zinc, lead and tin:

Copper	80% min. to 86% max.
Zinc	4% min. to 15% max.
Lead	2% min. to 6% max.
Tin	3% min. to 6% max.

NIPPLES All nipples shall be of the same composition as the pipe used, and the contractor or the contractor's source of supply shall guarantee that they were cut from trademarked lengths of Revere Brass Pipe (or Revere Red-Brass Pipe or Copper Pipe).

SUPPORT Only brass or copper hangers shall be used and they shall be spaced in such a way as to provide adequate

support. (For sizes $\frac{1}{2}$ inch and smaller, hangers shall be not more than 8 feet apart—for $\frac{3}{4}$ -inch pipe and larger, not more than 10 feet apart.) All hangers shall be arranged to hold the pipe horizontal, vertical or at the specified pitch.

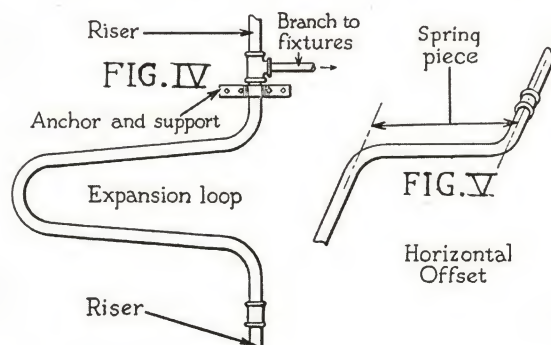
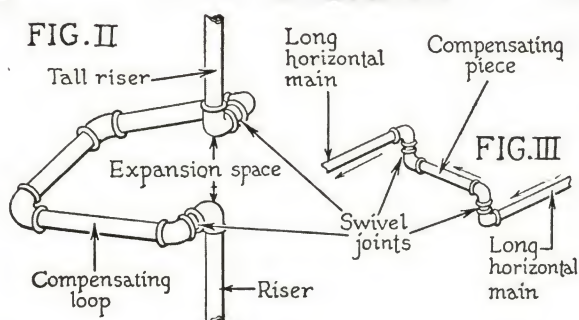
EXPANSION AND CONTRACTION Suitable means shall be provided for an allowance of $\frac{1}{4}$ inch in every 10 feet in hot and cold water lines for expansion and contraction.

INSULATION All pipe laid in concrete or cinders shall be protected in such a way that the brass will not be in contact with cinders or concrete at any time.

IRON PIPE CONNECTIONS If it is necessary to connect brass pipe with an iron pipe line, a trap or lift shall be provided which will prevent rust draining into the brass piping.

SERVICE LINES The service supply line from main to building shall be of Revere Red-Brass Pipe used in conjunction with a flexible copper gooseneck; or soft temper copper water tube with compression fittings shall be used. If rigid pipe is used, provisions shall be made for expansion, settling of the fill and other injurious conditions encountered in underground service work.

METHODS FOR PROVIDING FOR TEMPERATURE EXPANSION



DIVISION OFFICES AND MILLS

BALTIMORE DIVISION

1301 Wicomico Street
Baltimore, Md.

DALLAS DIVISION

2200 No. Natchez Avenue
Chicago, Ill.

ROME DIVISION

Rome, New York

MICHIGAN DIVISION

5851 West Jefferson Avenue
Detroit, Mich.

TAUNTON-NEW BEDFORD DIVISION

24 North Front Street
New Bedford, Mass.

ROME MANUFACTURING COMPANY DIVISION

Rome, New York

DISTRICT SALES OFFICES

New York, N. Y.

New York Central Bldg.
75 East 45th Street

Providence, R. I.

1215 Industrial Trust Bldg.
111 Westminster Street

Pittsburgh, Pa.

727 Gulf Bldg.

Philadelphia, Pa.

1201 Architects Bldg.
17th and Sansom Streets

Milwaukee, Wis.

626 E. Wisconsin Avenue

Atlanta, Ga.

911 Rhodes-Haverty Bldg.

Cleveland, Ohio

1110 Midland Bldg.

Cincinnati, Ohio

2616 Carew Tower

Grand Rapids, Mich.

922 Grand Rapids National Bank Bldg.

New Orleans, La.

425 Decatur Street

Los Angeles, Calif.

124 W. Fourth Street

San Francisco, Calif.

562 Russ Bldg.

Houston, Texas

Second National Bank Bldg.

Boston, Mass.

United Shoe Machinery Bldg.
140 Federal Street

Hartford, Conn.

209 Capitol National Bank Bldg.
410 Asylum Street

Minneapolis, Minn.

724 Metropolitan Bank Bldg.

St. Louis, Mo.

955 Telephone Bldg.
1010 Pine Street

Dallas, Texas

1314 Tower Petroleum Bldg.

Seattle, Wash.

317 Pioneer Bldg.

Revere Copper *and* Brass

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